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Investigation of red-cockaded woodpeckers in Virginia: 2002 report

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INVESTIGATION OF RED-COCKADED WOODPECKERS IN VIRGINIA: YEAR 2002 REPORT

CENTER FOR CONSERVATION BIOLOGY
COLLEGE OF WILLIAM AND MARY

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Cover Photos: Background photo- loblolly pines within Piney Grove Preserve. *Photo by Fred Atwood*. Inset - Rick Barnett (l), Don Schwab (m), and Brian van Eerden (r) feed crickets to translocated woodpecker shortly after arrival at Piney Grove. *Photo by Bryan Watts.*

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EXECUTIVE SUMMARY

A total of 32 different Red-cockaded Woodpeckers were present at Piney Grove at some point during the 2002 calendar year. This includes 15 resident adults, 6 nestlings, 3 adults translocated from Gates County, North Carolina prior to breeding season, and 8 hatch-year birds translocated from Carolina Sandhills NWR in the fall. The population included 18 birds in April and 25 birds in November. This compares with 11 and 15 birds respectively for April and November of 2001. Losses included 2 of 3 Gates County birds, 3 of 8 Carolina Sandhills birds, and 3 of 21 local birds. The gender of birds remaining in November included 11 males, 8 females, and 6 unknown.

Only 2 of 4 active woodpecker clusters in the spring of 2002 produced young. Cluster 1 still contained only 2 males by April precluding any breeding attempt. Cluster 6 contained only a single male still present from a fall 2001 translocation. Three of 3 nestlings in each of clusters 3 and 5 were known to have fledged. Each of the two broods contained two females and one male. Two of the Cluster 3 nestlings and all 3 Cluster 5 nestlings were still present in November, including all 4 females. Hatching dates were 3 and 5 May for Clusters 5 and 3 respectively.

In 2002, Piney Grove Preserve supported 84 trees that contained Red-cockaded start cavities, completed cavities, or cavity inserts. Twenty six new cavities were completed in 2002 including 2 cavities that were started in 2001 and 24 artificial inserts. Of 36 natural cavities still standing in 2002, 19 showed evidence of recent maintenance. Damage to natural cavities continued to increase in 2002 over 2001. Thirty of the 36 natural cavities showed evidence of damage by competitors. Damage on half of these was severe with the cavity entrance being enlarged more than twice normal size. Cavity restrictors were installed on 6 cavities and/or cavity starts to mediate damage. Squirrels were observed occupying cavities in 3 of 4 active RCW clusters. Standing water was discovered in 4 of 6 inserts checked in the fall indicating another potential problem area requiring monitoring.

BACKGROUND

Context - The Red-cockaded Woodpecker (*Picoides borealis*) is a federally endangered species. Within the past 100 years Red-cockaded Woodpeckers have disappeared completely from the northern portion of their breeding range. Historically, this species was recorded north into New Jersey and Pennsylvania. As recently as the 1930's and 1940's resident birds were known from the open maritime forests of Maryland. Most recently, the population in southeastern Kentucky was moved due to habitat loss making Virginia the only remaining northern population north of the Carolinas. In Virginia, breeding has continued to the present time but the number of both sites and birds has declined dramatically over the past 40 years. As recently as the late 1970's, 23 clans were known scattered across 5 counties. Currently, 2 productive clans exist in a single county.

The Red-cockaded Woodpecker is still in eminent danger of extinction within Virginia. A recent survey of the entire southeastern portion of Virginia failed to locate any additional active breeding sites. Less than 12 sites including approximately 2,500 ha of old growth pine remain that seem to be adequate to meet the breeding requirements of the species if restored. Within the past 2 years, The Nature Conservancy has purchased just over 600 ha of old growth pineland that supports the core of the remaining population. This land has been designated as the Piney Grove Preserve. The primary mission of this new reserve is the restoration of pine savannah habitat

Restoration of the Red-cockaded Woodpecker population in Virginia is requiring the aggressive use of techniques that have been successful further south. Intensive management of extant clans along with extensive habitat restoration is underway to stabilize the population and bring it back to pre-1980 levels. Continued translocations will be initiated to increase the small gene pool and establish clans on new sites. Management activities will be most effective if coupled with an intensive monitoring program.

Objectives – The primary objective of this project was to monitor the population within the Piney Grove Preserve. A secondary objective was to collect information relevant to the continued management of birds and their habitat. Specific objectives include

1) Determine the number and identification of all birds within each group at the throughout the breeding season.
2) To monitor the breeding activity of active pairs for the purpose of coordinating banding activities and determining productivity.
3) To monitor the status of cavity trees.

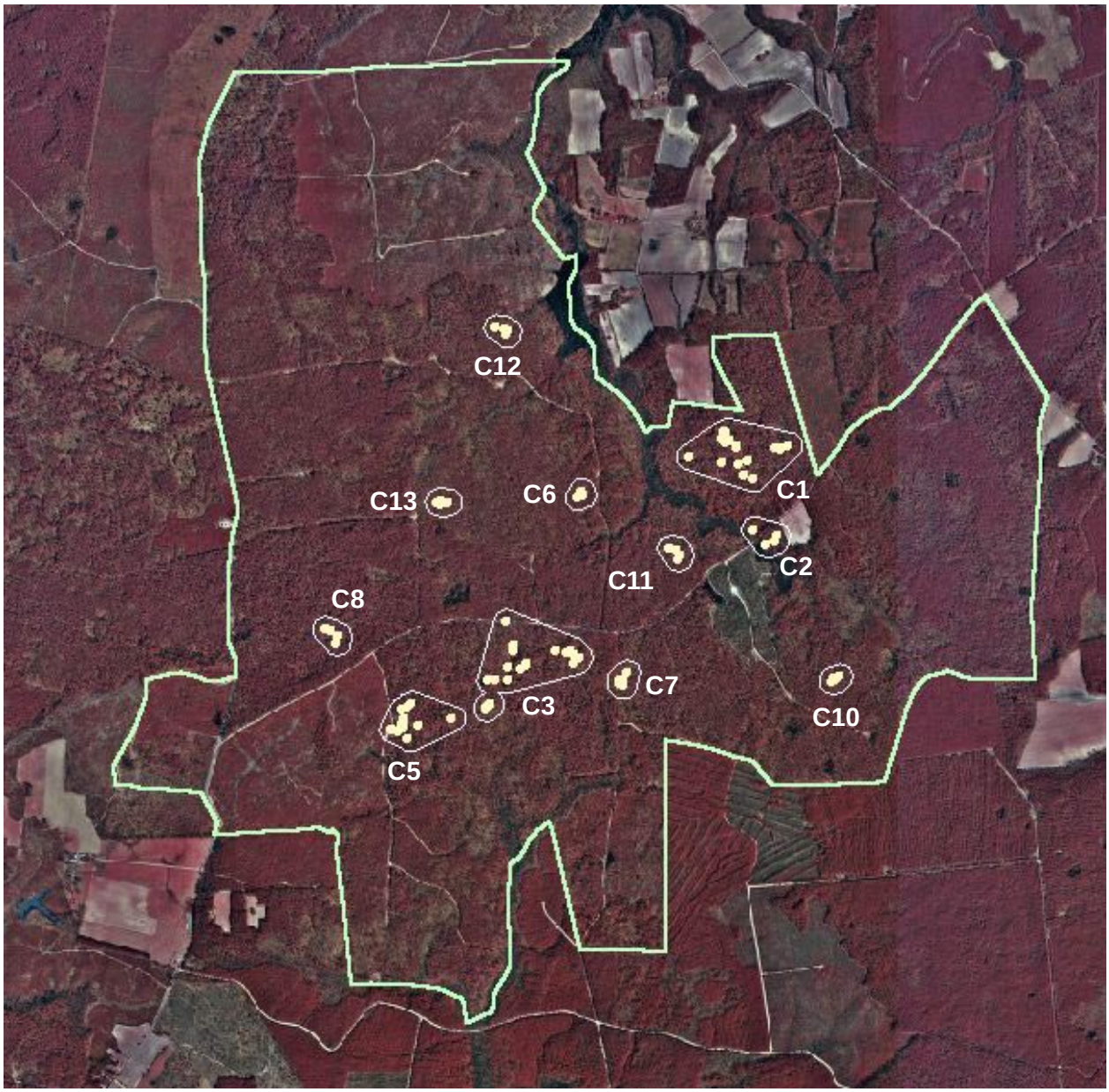
METHODS

Description

Piney Grove Preserve contains an old-growth loblolly and short-leaf pine community in Sussex County, Virginia. The site supports a complex of moderate-age pine stands interspersed with pockets of older trees ranging from 80 to 140 years. Historically, the site was managed for saw timber on a relatively long rotation by Gray Lumber Company. The site was purchased by Hancock Timber Resource Group in 1993. Under Hancock Timber's management, site quality was improved by removing the dense hardwood understory. The Nature Conservancy purchased the tract from Hancock Timber in 1998. The Nature Conservancy has developed an aggressive management program designed to restore the disturbance regime necessary to return the site to an open pine savanna.

A single clan of Red-cockaded Woodpeckers was discovered within this site in 1985. A second clan was discovered in 1994 and a third in 1995. These 3 clans still remain active. Since 1999, there have been nine recruitment clusters established by The Nature Conservancy through the installation of artificial cavities. There are now 11 independent cluster sites with either natural or artificial cavities (Figure 1).

Figure 1. Red-cockaded Woodpecker Cluster locations at Piney Grove Preserve. Bold boundary line denotes boundary of Preserve. Cluster boundary lines for visual reference only.



Banding

Adults - In 1998, Don Schwab banded 10 Red-cockaded Woodpeckers within the Piney Grove complex. Observations made during 2002 indicate that several of these birds are still present within the population (see results section below). Although completion of the color-marking program is a priority with clear management benefits, the capture and banding of wild birds is not risk free. For this reason, caution was used in the execution of the capture program. Every effort was made to target specific individuals that were known to be unbanded. This approach insured that the handling of banded birds was kept to a minimum. Because individuals frequently exchange cavities for roosting, this approach required extensive monitoring. Birds were identified and located in specific cavities as they returned to the cluster areas to roost. Known birds were then targeted for capture shortly after roosting in the evening or before emerging the following morning.

Nestlings - For logistical and safety reasons, banding of Red-cockaded Woodpecker nestlings is restricted to an age window of 5-9 days. Because of this restriction, close monitoring of breeding activity is essential to successful banding. During the early portion of the breeding season, both the breeding pair and the nest cavity from each cluster area were monitored closely to determine clutch initiation dates. The nest cavity within Cluster 1 was monitored regularly by inserting a video camera into the cavity entrance and inspecting the cavity for the presence of eggs. Due to the height of the nest cavities within clusters three and five, video monitoring was not possible. Within both of these clusters, breeding status was determined by observation of breeding birds. After dates of incubation were determined, an estimated hatching date was calculated. Nest cavities were monitored closely around the time of expected hatching to verify hatch dates. The window for banding was determined from estimated hatching dates.

All nestlings were banded during the recommended age window. Nest trees were climbed with ladders and nestlings were extracted from cavities using a noose apparatus. Nestlings were then lowered to the ground, banded, and returned to the cavity. Each nestling received a unique combination of color bands as described above. Nestlings were also weighed using a Pesola spring scale.

General Observations

During the course of banding operations, numerous observations of birds within the three cluster areas were made and recorded. Most of these observations were made around the time that birds went to roost in the evening or emerged in the morning. These observations were used to construct patterns of occurrence for individual birds, estimates of population size, patterns in cavity use, patterns in the presence and distribution of cavity competitors, etc. It should be noted that these observations do not fully represent systematic monitoring. In addtion, all known natural cavity trees within Piney Grove were examined to determine condition and to measure physical parameters for new cavities. The cavity plate and resin wells were examined for evidence of recent work by Red-cockaded Woodpeckers. The cavity entrance was examined for evidence of enlargement. Cavities that had an enlarged entrance were graded according to degree of enlargement relative to normal size. Several measurements were made of new cavity trees including age, diameter at breast height, height to first live limb, height of cavity, height of tree crown, and crown depth. Age was determined using an increment borer. Diameter was measured using a standard DBH tape. All height measurements were estimate using a clinometer at a distance of 100 feet (30.5 m).

Historic Sites

All historic sites in Virginia that are still standing and known to be used by Red-cockaded Woodpeckers for breeding in the past 15 years were visited to determine status. All Red-cockaded Woodpecker cavity trees still standing within these sites were examined for activity.

RESULTS

Population Monitoring

Sixteen birds were present within the Piney Grove Preserve going into the breeding season of 2002 (Table 1). This included 2 birds in cluster 1, 7 birds in cluster 3, 6 birds in cluster 5, and 1 bird in cluster 6. This compares to 11 birds that were present going into the breeding season of 2001. Only one bird was lost from the population between the fall of 2001 and the spring of 2002, however 2 birds were relocated after absences of 6 months and 2 years respectively.

Over the course of the 2002 season, 33 different woodpeckers were identified within the Piney Grove Preserve (Table 1). These birds included 15 resident adults, 6 nestlings, 1 of 3 birds translocated from Carolina Sandhills, NWR in the fall of 2001, 3 birds translocated from Gates County, NC in April 2002, and 8 birds translocated from Carolina Sandhills NWR in October 2002. By the fall of 2002, 24 birds remained including 13 resident adults, 5 young of the year, 1 of 3 birds from the Gates County translocation, and 5 birds from Carolina Sandhills NWR. Sex ratio of the population was10 males, 8 females, and 6 unknown (4 unknown, and 2 unidentified).

Breeding Observations

Only two of the four active clusters within the Piney Grove Preserve were productive during the 2002 breeding season. Detailed breeding observations and status for each clan are presented below.

Cluster 1 – Only 2 birds were present within the site. One of these birds was a male produced during a preceding breeding season and the other was a male of unknown origin. Since no female was available within the cluster, no breeding occurred.

Cluster 3 – DG/FWS and YE/FWS were determined to be the mated pair for this clan for the third year in a row. The nest cavity continues to be 79-1. First observation of birds feeding young was on 5 May. Three chicks were extracted and banded on 10 May to enable the banding operation to accommodate both clusters. These chicks appeared to be approximately 5 d old. All 3 nestlings fledged successfully. On 1 and 3 June fledge checks were conducted to determine sex of fledges. Observers confirmed two females and one male. By mid fall only the two females of the brood remained in the cluster.

Cluster 5 – LG/FWS and WH/FWS were determined to be the mated pair for this clan for the second consecutive year. The nest cavity also contintues to be 97-2. First observation of birds feeding young was on 3 May. Three chicks were extracted and banded on 10 May. Birds appeared to be approximately 7 d of age. A fledge check was conducted on 1and 3 June. All 3 nestlings fledged successfully and were identified as two females and one male. All 3 fledglings were still present in November.

Cluster 6 – Only the male translocated from Gates County in April of 2002 was present at this site during breeding season.

Table 1. Table of temporal occurrence for birds in Piney Grove from Spring 2000 to Fall 2002.

Location	ClusterID (left leg)	Bird ID (right leg)	Sex	Spr. 2000	Sum. 2000	Fall 2000	Spr. 2001	Sum 2001	Fall 2001	Spr. 2002	Sum. 2002	Fall 2002
C1	DG/YE/DG	PU/AL	F	X								
C1	DG/YE/DG	RE1/AL	F	X	X							
C1	DG/YE/DG	DB/AL	M	X	X	X						
C1	DG/YE/DG	YE/AL	F	X	X	X						
C1	DG/YE/DG	WH/AL	M		X	X	X	X	X	X		?[1]
C1	DG/YE/DG	RE2/AL	M				X	X	X	X	X	X
C1	AL/LB	ST/ST/OR	F					X[2]				
C1	AL/OR	DG/DG/OR	F									X[3]
C3	RE/DB/RE	PU1/AL	F									
C3	RE/DB/RE	PK1/AL	U									
C3	RE/DB/RE	YE/AL	F	X	X	X	X	X	X	X	X	X
C3	RE/DB/RE	DG/AL	M	X	X	X	X	X	X	X	X	X
C3	Unbanded	Unbanded	U	X	X	X	X	X	X	X	X	X
C3	RE/DB	LG1/AL	U		X					X	X	X
C3	RE/DB	RE1/AL	U		X							
C3	RE/DB	WH/AL	M		X	X	X	X	X	X	X	X
C3	RE/DB/RE	RE2/AL	M					X				
C3	RE/DB/RE	PU2/AL	U					X	X	X	X	X
C3	RE/DB/RE	LG2/AL	F					X	X			
C3	RE/DB/RE	PK2/AL	M					X	X	X	X	
C3	RE/DB/RE	AL/YE	F								X	X
C3	RE/DB/RE	AL/RE	F								X	X
C3	RE/DB/RE	AL/DB	M								X	
C3	AL/OR	DG/DG/OR	F									X[3]
C5	WH/LB/WH	DB1/AL	U									
C5	WH/LB/WH	RE/AL	M	X								
C5	WH/LB/WH	DB2/AL	F	X	X	X						
C5	WH/LB/WH	LG/AL	M	X	X	X	X	X	X	X	X	X
C5	WH/LB/WH	WH/AL	F	X	X	X	X	X	X	X	X	X
C5	WH/LB/WH	YE/AL	M	X	X	X	X	X	X	X	X	X
C5	Unbanded	Unbanded	U	X	X	X	X	X	X	X	X	X
C5	WH/LB/WH	AL/RE	U		X	X	X	X				
C5	WH/LB/WH	PU/AL	U		X							
C5	WH/LB/WH	PK1/AL	U		X	X						
C5	WH/LB/WH	PK2/AL	M					X	X	X	X	X
C5	WH/LB/WH	DG/AL	F					X	X	X		
C5	WH/LB/WH	AL/YE	F								X	X
C5	WH/LB/WH	AL/LB	F								X	X
C5	WH/LB/WH	AL/DB	M								X	X
C6	AL/DG	WH/WH/PU	F					X	X			
C6	AL/LG	DB/DB/YE	M					X	X	X	X	X
C6	A//WT	ST/ST/OR	F									X

[1] This bird was identified as a Cluster 1 bird but individual ID could not be determined. Assumed to be WH/AL male.
[2] This South Carolina bird was released in Cluster 1 during summer 2001 and has not been seen since.
[3] This bird, also from South Carolina, was released in Cluster 1 in October 2002, and was subsequently observed foraging with Cluster 3 birds in late November. It is not known as of this report whether this bird is roosting in Cluster 3 or not.

Table 1. ***cont.***

Location	ClusterID (left leg)	Bird ID (right leg)	Sex	Spr. 2000	Sum. 2000	Fall 2000	Spr. 2001	Sum 2001	Fall 2001	Spr. 2002	Sum. 2002	Fall 2002
C7	BK/YE/DB	RE/AL	F							X[4]	X	X
C7	YE/DB/YE	WH/AL	M							X[4]		
C7	YE/DB/YE	LG/AL	M							X[4]		
C8	AL/OR	WH/WH/MV	M									X[5]
C11	AL/LG	PU/PU/LG	M									X[5]
C11	AL/WH	OR/OR/DB	F									X[5]
C12	AL/OR	DB/DB/WH	M									X[5]
C12	AL/OR	WH/WH/LB	F									X[5]
C13	AL/OR	OR/OR/LG	M									X[5]

[4] Translocated from Gates County, North Carolina and released at Piney Grove on 2 April, 2002.
[5] Translocated from Carolina Sandhills NWR and released at Piney Grove October, 2002.

Translocations

Three translocation events were conducted in 2002. They moved 3, 6, and 2 birds respectively from both North and South Carolina. See Table 2 below for details, and following narrative.

Table 2. 2002 Translocation Data

Origin	Band #	Band Combination		Sex	Capture	Destination	Tree	Release
		Left	Right					
Gates Co.	801-40249	BK/YE/DB	RE/AL	F	4/2/02	PGP – C7	112	4/3/02
Gates Co.	1751-42837	YE/DB/YE	WT/AL	M	4/2/02	PGP – C7	113	4/3/02
Gates Co.	1751-42838	YE/DB/YE	LG/AL	M	4/2/02	PGP – C7	114	4/3/02
CSNWR	1681-89800	AL/LG	PR/PR/LG	M	9/30/02	PGP – C11	142	10/2/02
CSNWR	1751-82968	AL/WT	OR/OR/DB	F	9/30/02	PGP – C11	140	10/2/02
CSNWR	1751-83142	AL/OR	DB/DB/WT	M	9/30/02	PGP – C12	130	10/2/02
CSNWR	1751-83201	AL/OR	WT/WT/LB	F	9/30/02	PGP – C12	133	10/2/02
CSNWR	1751-83213	AL/OR	OR/OR/LG	M	9/30/02	PGP – C13	121	10/2/02
CSNWR	1751-83208	AL/OR	WT/WT/MV	M	9/30/02	PGP – C8	173	10/2/02
CSNWR	1751-83133	AL/WT	ST/ST/OR	F	10/17/02	PGP – C6	13	10/18/02
CSNWR	1751-83163	AL/OR	DG/DG/OR	F	10/17/02	PGP – C1	39	10/18/02

Gates County, North Carolina: 4-5 April

The Gates County translocation effort arose out of a need to move birds from a private land holding as part of a FWS Section 10 Habitat Management Plan. Originally, there were up to 5 birds present at the site in northeastern North Carolina. The numbers had dropped to 3 individuals by the time the relocation effort was started. Present were a breeding pair and a male helper. Trapping, banding, and moving the birds went smoothly. Brian van Eerden was

assisted by Susan Miller in cooperation with John Hammond from the Southern Pines FWS Ecological Services office.

The birds were trapped on the evening of April 4th and moved that night into recruitment Cluster 7 at Piney Grove. The release was carried out at sunrise on the 5th and all birds emerged in good shape.

Figure 2. Feeding crickets to RCW en route to Piney Grove. *Photo by Bryan Watts.*

Carolina Sandhills NWR Translocation 2002 – Part 1: 30 Sept. – 2 Oct.

On the evening of 30 September, 2002 six red-cockaded woodpeckers were trapped at Carolina Sandhills NWR. Present were Bryan Watts, Don Schwab, and Rick Barnett along with Laura Shiver and other CSNWR staff. The birds were placed in holding boxes and held overnight on site. Watts, Schwab and Barnett departed the next morning (1 Oct.) and drove to Piney Grove where they arrived at approximately 1 p.m. The birds were fed de-legged crickets each hour on the hour all that day beginning at about 7 a.m. At dusk, the birds were placed in cavities at Piney Grove which were then covered with fine mesh screen. All birds were placed without incident. Birds were handled by Watts and Schwab.

This translocation effort was planned to bring back 3 males and 3 female birds. An error in band/bird identification resulted in the translocation of 4 males and 2 females however. This resulted in the placement of male birds as lone individuals at 2 cluster sites: clusters 8 and 13. Clusters 11 and 12 each received a pair.

Figure 3. Rick Barnett preparing a transport box to receive a bird. *Photo by Bryan Watts.*

Release

On the morning of 2 October, project personnel and volunteers assisted with the release of the newly translocated birds at Piney Grove. Events were as follows:

Cluster 11 – The male emerged first at 0713. He flew west toward the other cavity trees in the cluster. The female emerged at 0715 but did not immediately interact with the male. By 0718 the two birds were departing the area but were never observed in close proximity to each other or seen to be interacting to any extent.

Cluster 12 – The male became active in the cavity at 0700, but was delayed access to the exterior while observers waited for the female. The female was observed at the cavity entrance beginning at 0734. At 0740 both screens were removed and the two birds emerged. They

vocalized and met briefly on the same tree. They foraged in the cluster area together until 0744, then departed the area.
Cluster 8 – The lone male became active at the cavity entrance at 0702 and was released at 0703. He was left foraging in the vicinity of the cluster as the observers departed by 0705.

Cluster 13 – The lone male was released at 0729. He stayed within the cluster site foraging until 0735, then flew off to the southwest.

Figure 4. Carolina Sandhills NWR longleaf pine community. *Photo by Bryan Watts.*

Figure 5. Rick Barnett points out an extremely low RCW cavity at Carolina Sandhills NWR. Low cavities are characteristic of stable fire-maintained communities where mid-story encroachment is not a factor. *Photo by Bryan Watts.*

Carolina Sandhills NWR Translocation 2002 – Part 2: 17-19 October

A second translocation effort was initiated on 17 Ocober to bring two additional RCW females to Piney Grove. Brian van Eerden and Don Schwab travelled to CSNWR to meet Laura Shiver and staff. Two female birds were trapped that evening and held overnight. Schwab and van Eerden departed SC on the 18th and drove to Piney Grove stopping hourly to feed the woodpeckers. The birds were fed de-legged crickets for each feeding until they reached Piney Grove where they received wood borers for the final feeding. The birds were placed in cavities at dusk that were then covered with fine mesh screen. The two females were placed in clusters that were thought to hold only bachelor males: clusters 1 and 6.

Release

On the morning of October 19 project personnel released the two females. Following are the event details:

Cluster 1 – At 0715, the resident male from Tree #48 emerged and foraged/vocalized briefly in the vicinity of his cavity tree. Rather than flying south to the central area of the cluster however,

Figure 6. Don Schwab prepares to place a translocated woodpecker into an artificial cavity at Piney Grove. The bird will be screened in overnight, then released at sunrise when an observer pulls the screen free of the cavity via a connected rope. *Photo by Bryan Watts*.

the bird departed the area flying west toward Cluster 6. The female was then released and began calling in muted tones around her cavity tree. She called there for approximately 5 minutes and then began moving east out of the cluster. Her vocalizations increased in volume and pitch as she moved further away from her roost tree. The female was estimated to be about 150 meters away to the east almost out of hearing of the observer when the resident male was heard returning to the site. The male flew straight toward the female's roost tree and continued past it flying out of sight to the east. Two birds were then heard vocalizing repeatedly in the distance to the east and eventually moved out of range. It was assumed that the male caught up to the female.

Cluster 6 – The female at this site was released upon emergence of the male at approximately 0720. The two birds foraged and vocalized together for several minutes before moving off.

Cavity Trees

Piney Grove Preserve currently has 84 trees that contain Red-cockaded start cavities (6), completed cavities (36), or cavity inserts (42) (Table 3a-d). Three of these trees support 2 completed cavities or starts. Two cavities started in 2001 were completed in 2002. Twenty-four artificial inserts were installed in 2002 comprising 6 new cluster sites: clusters 7, 8, 10,11,12, and 13.

Tree Measurements – No new tree measurements were taken in 2002.

Cavity Maintenance – Of the 36 natural cavities still standing in 2002, 19 (53%) showed evidence of recent maintenance activity (Table 3a-d). Ten (24%) of 42 artificial inserts showed evidence of recent work on resin wells.

Cavity Use – Only 22 (26%) of 84 available cavities were determined to be used by roosting birds in 2002 (Table 3a-d). This includes 15 (42%) of 36 natural cavities and 7 (17%) of 42 artificial cavities. For both clusters 3 and 5, the same cavity was used for nesting in 2002 as in 2001.

Cavity Damage – Damage to natural cavities continued to increase in 2002, and additional problems were discovered with water in artificial inserts. Of 36 natural cavities available, 30 (83%) showed evidence of damage by competitors. Damage on half of these was severe with the cavity entrance being enlarged more than twice normal size. Approximately one third of the cavities that showed damage in 2001 showed signs of ongoing damage. Both of the nest cavities that were active in 2002 show slight amounts of competitor damage. In an effort to mediate continuing damage, 6 cavity restrictors were installed in 2002; 1 in Cluster 1 (#47), 3 in

Cluster 3 (#s 3,4, and 79-2), and 2 in Cluster 5 (#s 94 and 97-1). A third cavity restrictor was attempted in Cluster 5 at cavity #23, but the damage was too great to permit a good seal around the cavity, so the effort was abandoned.

Three of the 4 artificial cavities at Cluster 4 were checked for squirrels during fall 2002 but revealed standing water inside the cavities instead (cavities 81,83, and 84). An additional insert in Cluster 6 also held water. A quick check of two other artificial cavities in Cluster 3 showed dry interiors, however it was decided that the Peeper would have to be used thoroughly to check all artificial inserts prior to the onset of breeding season in 2003. Water problems in conjuction with flying squirrels pose a serious problem to cluster site viability for red-cockadeds.

Cavity Competitors – Five flying squirrels were removed from cavities in 2002 (B. van Eerden): 2 from Cluster 1, 2 from Cluster 6, and 1 from Cluster 5. The removal device was modeled after others in use in the southeast. Squirrel removal will need to become a routine event at Piney Grove to ensure cavity availability at critical times of the year. Additional cavity competitors observed in 2002 included white-breasted nuthatches, red-bellied woodpeckers, hairy woodpeckers, flickers, and pileated woodpeckers. White-breasted nuthatches nested successfully in cavity #45 in Cluster 1, and red-bellied woodpeckers were observed in Tree #48.

Table 3a. Summary of Red-cockaded Woodpecker cavity status, use, maintenance, and enlargement status within Clusters 1 and 2 at Piney Grove Preserve. Years 2000 through 2002 are shown for comparison.

Cavity ID	Status	Use 2000	Use 2001	Use 2002	Maint. Activity 2000	Maint. Activity 2001	Maint. Activity 2002	Enlargemnt Status 2000	Enlargemnt Status 2001	Enlargemnt Status 2002
Cluster 1										
35-01	AS	----	N	N	-----	Y	N	-----	N	Y (slight)
36-01	A	----	N	N	-----	N	N	-----	N	N
37-01	AS	----	N	N	-----	Y	N	-----	Y (slight)	Y (slight)
38-01	C	----	N	N	-----	Y	Y	-----	N	N
39-01	C	----	N	Y	-----	Y	Y	-----	Y (slight)	Y (slight)
40-01	C	N	N	N	N	N	N	Y (>4X)	Y (>4X)	Y (>4X)
41-01	C	Y	N	N	Y	Y	N	Y (slight)	Y (>4X)	Y (>4X)
43-01	C	N	N	N	N	Y	N	Y (<2X)	Y (>2X)	Y (>2X)
44-01	C	N	N	N	N	N	N	Y (>2X)	Y (>4X)	Y (>4X)
45-01	C	Y	Y	N	Y	Y	Y	N	N	Y (slight)
46-01	C	Y	N	N	Y	N	N	Y (<2X)	Y (>2X)	Y (>2X)
47-01	C	N	N	N	Y	Y	Y	N	Y (slight)	Y (slight)*
48-01	C	Y	Y	Y	Y	Y	Y	N	Y (slight)	Y (slight)
49-01	C	N	N	N	Y	N	N	Y (slight)	Y (>2X)	Y (>2X)
50-01	A	Y	N	N	Y	N	N	N	N	N
51-01	A	Y	N	N	Y	N	N	N	N	N
52-01	A	N	N	N	N	Y	Y	N	N	N
Cluster 2										
60-01	A	N	N	N	N	N	N	N	N	N
61-01	A	N	N	N	N	N	N	N	N	N
62-01	A	N	N	N	N	N	N	N	N	N
63-01	A	Y	N	N	N	N	N	N	N	N

Table 3b. Summary of Red-cockaded Woodpecker cavity status, use, maintenance, and enlargement status within Clusters 3 and 4 at Piney Grove Preserve. Years 2000 through 2002 are shown.

Cavity ID	Status	Use 2000	Use 2001	Use 2002	Maint. Activity 2000	Maint. Activity 2001	Maint. Activity 2002	Enlargemnt Status 2000	Enlargemnt Status 2001	Enlargemnt Status 2002
Cluster 3										
01-01	A	-----	N	Y	-----	Y	Y	-----	N	N
02-01	A	-----	Y	Y	-----	Y	Y	-----	N	N
03-01	C	-----	Y	Y	-----	Y	Y	-----	N	N*
04-01	C	-----	N	Y	-----	Y	Y	-----	N	N*
05-01	AS	-----	-----	-----	N	N	N	N	N	N
06-01	C	-----	Y	Y	-----	Y	Y	-----	N	Y (<2X)
07-01	AS	-----	-----	-----	N	Y	N	N	Y(slight)	Y (slight)
70-01	C	N	N	N	N	N	N	Y(>2X)	Y(>2X)	Y (>2X)
71-01	C	N	N	N	N	N	N	Y(slight)	Y(>2X)	Y (>2X)
72-01	C	N	N	N	N	N	N	Y(>2X)	Y(>2X)	Y (>2X)
73-01	C	N	N	N	N	N	N	Y(>2X)	Y(>2X)	Y (>2X)
74-01	C	Y	Y	Y	Y	Y	Y	N	Y	Y (slight)
75-01	C	Y	N	N	Y	Y	N	N	Y(slight)	Y (slight)
76-01	C	N	N	N	Y	N	N	N	Y(slight)	Y (slight)
77-01	C	N	N	N	N	N	N	Y(>4X)	Y(>4X)	Y (>4X)
79-01	C	Y	Y	Y	Y	Y	Y	N	Y(slight)	Y (slight)
79-02	S	-----	-----	-----	------	Y	Y	-----	N	Y(slight)*
Cluster 4										
81-01	A	N	N	N	N	Y	Y	N	N	N
82-01	A	Y	Y	Y	N	Y	Y	N	N	N
83-01	A	N	Y	Y	N	Y	Y	N	N	N
84-01	A	Y	Y	N	Y	N	N	N	N	N

Table 3c. Summary of Red-cockaded Woodpecker cavity status, use, maintenance, and enlargement status within Clusters 5 and 6 at Piney Grove Preserve. Years 2000 through 2002 are shown for comparison.

Cavity ID	Status	Use 2000	Use 2001	Use 2002	Maint. Activity 2000	Maint. Activity 2001	Maint. Activity 2002	Enlargemnt Status 2000	Enlargemnt Status 2001	Enlargemnt Status 2002
Cluster 5										
20-01	C	-----	Y	Y	-----	Y	Y	-----	N	Y(<2X)
21-01	C	-----	N	Y	-----	Y	Y	-----	Y(slight)	Y(slight)
22-01	C	-----	Y	Y	-----	Y	Y	-----	N	N
23-01	C	-----	Y	Y	-----	Y	Y	-----	Y(<2X)	Y(>2X)
92-01	AS	-----	-----	N	N	N	N	N	Y(slight)	Y(slight)
93-01	C	Y	Y	N	Y	Y	N	N	N	N
94-01	C	N	Y	Y	Y	Y	Y	N	Y(<2X)	Y(<2X)*
95-01	C	Y	N	N	Y	N	N	Y(slight)	Y(<2X)	Y(<2X)
96-01	C	Y	N	N	Y	N	N	Y(slight)	Y(>4X)	Y(>4X)
96-02	C	Y	N	N	Y	N	N	Y(slight)	Y(slight)	Y(<2X)
97-01	C	Y	N	N	Y	N	N	N	Y(>2X)	Y(>2X)
97-02	C	Y	Y	Y	Y	Y	Y	N	Y(<2X)	Y(<2X)*
98-01	C	Y	Y	Y	Y	Y	N	N	Y(slight)	Y(slight)
99-01	C	Y	Y	Y	Y	Y	N	N	N	N
Cluster 6										
10-01	A	-----	N	N	-----	N	N	-----	N	N
11-01	A	-----	Y	Y	-----	Y	Y	-----	N	N
12-01	A	-----	N	N	-----	N	N	-----	N	N
13-01	A	-----	N	N	-----	Y	Y	-----	Y	Y

Table 3d. Summary of Red-cockaded Woodpecker cavity status, use, maintenance, and enlargement status within recruitment Clusters 7 through 13 at Piney Grove Preserve.

Cavity ID	Status	Use 2000	Use 2001	Use 2002	Maint. Activity 2000	Maint. Activity 2001	Maint. Activity 2002	Enlargemnt Status 2000	Enlargemnt Status 2001	Enlargemnt Status 2002
Cluster 7										
110	A	-----	-----	N	-----	-----	N	-----	-----	N
111	A	-----	-----	N	-----	-----	N	-----	-----	N
112	A	-----	-----	Y	-----	-----	N	-----	-----	N
113	A	-----	-----	Y	-----	-----	Y	-----	-----	N
114	A	-----	-----	Y	-----	-----	N	-----	-----	N
Cluster 8										
170	A	-----	-----	N	-----	-----	N	-----	-----	N
171	A	-----	-----	N	-----	-----	N	-----	-----	N
172	A	-----	-----	N	-----	-----	N	-----	-----	N
173	A	-----	-----	Y	-----	-----	N	-----	-----	N
Cluster 10										
150	A	-----	-----	N	-----	-----	N	-----	-----	N
151	A	-----	-----	N	-----	-----	N	-----	-----	N
152	A	-----	-----	N	-----	-----	N	-----	-----	N
153	A	-----	-----	N	-----	-----	N	-----	-----	N
Cluster 11										
140	A	-----	-----	Y	-----	-----	Y	-----	-----	N
141	A	-----	-----	N	-----	-----	N	-----	-----	N
142	A	-----	-----	Y	-----	-----	N	-----	-----	N
143	A	-----	-----	N	-----	-----	N	-----	-----	N
Cluster 12										
130	A	-----	-----	Y	-----	-----	N	-----	-----	N
131	A	-----	-----	N	-----	-----	N	-----	-----	N
132	A	-----	-----	N	-----	-----	N	-----	-----	N
133	A	-----	-----	Y	-----	-----	N	-----	-----	N
Cluster 13										
121	A	-----	-----	Y	-----	-----	Y	-----	-----	N
122	A	-----	-----	N	-----	-----	N	-----	-----	N
123	A	-----	-----	N	-----	-----	N	-----	-----	N
124	A	-----	-----	N	-----	-----	N	-----	-----	N

Banding

Since the spring of 1998, 34 different birds have been banded within the Piney Grove complex (Table 4). This includes 10 birds in 1998, 11 birds in 2000, 7 birds in 2001, and 6 birds in 2002. The 2002 birds were all nestlings; 3 each from Clusters 3 and 5. Of these 6 nestlings, 4 were female and 2 male.

Two adult birds remain unbanded within Piney Grove. These include one bird each in clusters 3 and 5. These birds have been monitored closely and have tended to utilize cavities that are beyond the height reachable with the telescopic net. One attempt was made to trap the unbanded bird in Cluster 3 when it was observed roosting in a lower cavity, but it would not emerge from the tree. Monitoring is ongoing to determine when or if these birds relocate to situations that would allow for safe capture.

Table 4. Summary of individual Red-cockaded Woodpeckers banded within Piney Grove (1998-2002).

Date	Cl	FWS	Left	Right	Age	Sex	Wing	Culmen	Weight
01/11/98	1	1581-66206	DG/YE/DG	DB/AL	AHY	M	-----	-----	-----
08/15/98	1	1581-66209	DG/YE/DG	PU/AL	AHY	F	-----	-----	-----
04/05/00	1	1581/66211	DG/YE/DG	RE/AL	AHY	F	122	17.9	47.5
05/29/00	1	1581-66219	DG/YE/DG	WH/AL	~7-8d	U	-----	-----	24.0
04/28/01					SY	M	117	16.8	47.0
10/02/00	1	1581-66223	DG/YE/DG	YE/AL	AHY	F	120	16.6	-----
04/28/01	1	1581-66224	DG/YE/DG	RE/AL	AHY	M	118	16.9	48.0
09/26/01	1	1681-89697	AL/LB	ST/ST/OR	HY	F[3]	-----	-----	-----
02/10/98	3	1581-66203	RE/DB/RE	YE/AL	AHY	F	117	17.0	47.8
02/11/98	3	1581-66204	RE/DB/RE	PU/AL	AHY	F	-----	-----	-----
02/11/98	3	1581-66205	RE/DB/RE	DG/AL	AHY	M	-----	-----	-----
08/10/98	3	1581-66208	RE/DB/RE	PK/AL	HY	U	-----	-----	-----
05/12/00	3	1581-66214	RE/DB	WH/AL	~7d	U	-----	-----	11.0
01/29/02					SY	M	119	16.8	48.5
05/12/00	3	1581-66215	RE/DB	LG/AL	~7d	U	-----	-----	12.0
05/12/00	3	1581-66216	RE/DB	RE/AL	~7d	U	-----	-----	12.0
05/09/01	3	1581-66225	RE/DB/RE	RE/AL	~7d	M[2]	-----	-----	25.0
05/09/01	3	1581-66226	RE/DB/RE	LG/AL	~7d	F[2]	-----	-----	27.0
05/09/01	3	1581-66227	RE/DB/RE	PK/AL	~7d	M[2]	-----	-----	29.0
05/09/01	3	1581-66228	RE/DB/RE	PU/AL	~7d	U	-----	-----	22.0
05/10/02	3	1581-66234	RE/DB/RE	AL/YE	~5d	F[2]	-----	-----	13.0
05/10/02	3	1581-66235	RE/DB/RE	AL/RE	~5d	F[2]	-----	-----	19.0
05/10/02	3	1581-66236	RE/DB/RE	AL/DB	~5d	M[2]	-----	-----	20.0
02/09/98	5	1581-66201	WH/LB/WH	RE/AL	AHY	M[1]	-----	-----	-----
02/10/98	5	1581-66202	WH/LB/WH	LG/AL	AHY	M	121	18.0	-----
02/12/98	5	1581-66207	WH/LB/WH	WH/AL	U	F[1]	-----	-----	-----
08/16/98	5	1581-66210	WH/LB/WH	DB1/AL	HY	U	-----	-----	-----
04/20/00	5	1581-66212	WH/LB/WH	YE/AL	AHY	M	118	17.5	46.0
04/30/00	5	1581-66213	WH/LB/WH	DB2/AL	AHY	F	122	17.0	44.0
06/16/00	5	1581-66220	WH/LB/WH	PU/AL	~7d	U	-----	-----	30.0
06/16/00	5	1581-66221	WH/LB/WH	PK/AL	~7d	U	-----	-----	32.0
06/16/00	5	1581-66222	WH/LB/WH	AL/RE	~7d	U	-----	-----	26.0
05/16/01	5	1581-66229	WH/LB/WH	DG/AL	~7d	F[2]	-----	-----	24.0
05/16/01	5	1581-66231	WH/LB/WH	PK/AL	~7d	M[2]	-----	-----	22.0
05/10/02	5	1581-66230	WH/LB/WH	AL/YE	~7d	F[2]	-----	-----	26.0
05/10/02	5	1581-66232	WH/LB/WH	AL/DB	~7d	M[2]	-----	-----	27.0
05/10/02	5	1581-66233	WH/LB/WH	AL/LB	~7d	F[2]	-----	-----	24.0

[1]initially banded as opposite sex but behavioral observations confirm sex.
[2]Gender determined during fledge checks.

Cluster Interactions

At least two territorial disputes occurred during the breeding season. On 29 April Cluster 5 birds were well into incubation when the Cluster 1 red male arrived and began vocalizing with the Cluster 5 breeding female. With that, the unbanded C5 bird emerged and chased off the C1 intruder to the northeast. The unbanded bird returned after about 5 minutes but the C1 bird was not seen in that vicinity again. On the same morning an unidentified Cluster 5 bird was observed in the vicinity of the Cluster 3 nest tree but was rebuffed immediately by the C3 pink bird and a light green banded bird.

Tracking the movement of translocated birds has revealed a few unexpected results. At two different times now (fall 2001 and fall 2002) a translocated female has been placed with the two bachelor males at Cluster 1. The two males from Cluster 1 have exhibited weaker ties in 2002 with the White bird absent for much of the time. Then in November one of the South Carolina translocated males was observed roosting in Cluster 1, Tree #39 and was seen at least two other times foraging with the resident Red male. Toward the end of November, three birds were observed together at the site: the resident red male, the SC male, and an unidentified Cluster 1 bird which is suspected to still be the white male.

On 20 November, the South Carolina female that had been placed with the Cluster 1 males was observed foraging with the Cluster 3 clan as they crossed Rt. 604 heading north around 0830.

HISTORIC SITES

Route 460 Site (Sussex County)

Site condition – This site remains forested with the exception of the several acres that were removed in 1988 in association with the harvesting violation by Gray Lumber Company. In the intervening 12 years the site has succumbed to severe degradation brought on by hardwood encroachment. Although hardwoods are still predominantly confined to the subcanopy, the stand is unsuitable for occupation by Red-cockaded Woodpeckers. An additional detraction to this site is its size. The stand of mature timber is limited to the corridor between Route 460 and the railroad tracks. The harvesting of the large mature pine stand to the north of Route 460 in 1989 removed the last remaining option for suitable foraging habitat in the area. As a result, this site should not be considered viable for re-occupation even if remaining habitat could be improved.

Cavity tree status – None detected

Bird status – No evidence of activity present.

Route 608 Site (Sussex County)

Site condition - This site was harvested in 2000. Old growth timber now exists only as boundary trees and small corridors associated with wetland sites at various

points on the property. The majority of the site is in pine regeneration approximately 3 years old.

This tract of land was purchased in December 2001 by a small business partnership comprised of the following principals: Mike Walker, Ashton Richardson, and Lawrence Jonak. These individuals are now interesting in investigating various alternatives for pine timber management on the site. One of their initial hopes was to restore this site to a long leaf pine community, although they would require some type of land owner subsidy to help finance it. They have contacted both CCB and TNC regarding the historical status of the site and long-term value to RCWs.

Stony Creek Rt. 40 Site (Sussex County)

Site condition – The core site is still present although hardwoods are a dominant sub-canopy species in the stand. This represents the oldest known Red-cockaded Woodpecker site. Both random and cavity trees have yielded ages exceeding 130 years. While hardwood removal would easily bring this site into suitability for use by Red-cockadeds, the site would likely not have the longevity that other sites exhibit. Most of the mature timber is well into senescence and there is not a prominent age class of younger pines, with the exception of a vigorous sapling stand that dominates the understory over much of the site. An adjacent stand across Rt. 40 harbors a better mix of old and moderate pines although the stand comprises less than 50 acres. Collectively these two stands harbor less than 100 acres of suitable habitat, assuming a thorough hardwood removal operation. There is evidence of recent activity by pine beetles in several places within the stand.

Ashton Lewis Lumber Company, in Gatesville, North Carolina purchased these stands from Gray Family Trust in 2002. They plan to harvest the timber within the next 18 months. The stand was still intact as of February 12, 2003.

Cavity tree status – Two detected. Although both trees were alive and vigorous, the cavity in each had been enlarged substantially, precluding use by Red-cockadeds. There was no evidence of activity by Red-cockadeds anywhere on the tree. Resin wells and resin were dried and crusted over.

Bird status – Last detection was a vocalizing bird to the southeast of the stand in Spring, 1996.

Route 35 Site (Southampton County)

Site condition – This site was purchased by Ashton Lewis Lumber Company in late 2001, with plans to harvest the timber in stages over the next two to three years. The harvest plan received approval from the state and Fish and Wildlife Service

Ecological Services office. The site was visited in spring 2002 and no new evidence of birds was detected. The last active cavity tree was present but showed no signs of recent activity. The cavity was only slightly enlarged and mis-shapen, but still usable by RCWs.

This site was visited again on February 12, 2003 and found to be harvested. The entire stand that had included all of the historical cavity trees as well as the most recent cavity trees was harvested during the summer/fall of 2002. Remaining timber on this tract is relegated to two small stands primarily in the 40 to 60 year age class. These two stands collectively harbor less than 100 acres.

Route 612 Site (Southampton County)

Site condition – This site represents one of the final stands in an over 600 hectare block, the remainder having been harvested within the last 10 years. It constitutes a natural pine stand, with no evidence of historical management for sawtimber. Hardwoods are a codominant in the canopy and comprise almost the entire subcanopy and midstory component. Pine constitutes a low proportion of the stand basal area. Red-cockaded Woodpeckers occupied the only portion of the stand that was dominated by old growth pines. The current stand boundaries comprise little more than 60 hectares and exists as an island within miles of plantation pine.

Cavity tree status – Three detected. The last cavity tree used at this site was a tree that had broken off midway up in a 1999 storm. The tree broke at the level of the original cavity, but the lone bird excavated a new cavity in the snag. By fall of 2001, the bird had excavated and was using a second new cavity, although resin flow was all but absent at that time. By the fall of 2002 the snag was long dead with the remaining bark sloughing off. There was no recent evidence of RCW activity on the tree. A second cavity tree showed no recent signs of cavity maintenance. The cavity was enlarged although still appeared suitable for Red-cockaded use. The third tree harbored a start cavity that showed no evidence of having been completed, with no recent signs of Red-cockaded Woodpecker activity, although there had been some earlier work on resin wells.

Bird status – A single bird was last detected in the vicinity of the cavity trees in September of 2001 and has not been observed since. A search of the surrounding area in fall of 2002 yielded no new evidence of red-cockaded woodpecker activity. This site appears to have been abandoned.

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APPENDIX I. Cluster 1 Field Observations and Cavity Use Summary Table - 2002

CLUSTER 1 OBSERVATIONS -2002		
Date	**Observer**	**Notes**
4/21/02	D. Bradshaw	Arrived at 0830. Red Cluster 1 male observed foraging down along 604 near entrance. The bird crossed 604 and disappeared into younger stand on south side. Walked in to cluster area and heard a second bird in vicinity but could not locate it for ID. White-breasted nuthatches were feeding young in Tree #45. Walked over to new trees near loading area and noticed recent work on the good tree. Other tree still appeared as start cavity. Departed area at 0900.
7/23/02	B. van Eerden	Inspected plate on Tree 47 that was install several weeks ago. Still appears in good condition.
8/29/02	D. Bradshaw	Arrived and took up a position approximately 50 meters south of Tree #48 at 0630. RCW head projecting from #48 cavity at 0640. Bird examined the surroundings for 20 minutes, finally emerging at 0700. The bird called and foraged for approximately 5 minutes in the vicinity of the cavity trees then moved toward the central area just as a second bird was heard further to the south. The first bird stopped short and did not join up with the second bird. It was identified as the Cluster 1 Red bird. I then moved south to pick up the second bird but could not find another bird at that time. I stayed until 0800 following the red bird thinking it would hook up with the second bird, but was unable to locate another RCW.
9/9/02	D. Bradshaw	2 birds observed; did not interact. Departed before could be identified. Birds observed flushing before cluster 7 bird.
9/24/02	B. Paxton	Observed red banded bird emerge from Tree #48 and forage in vicinity for a few minutes, but no other birds were seen or heard.
11/10/02	R. Barnett	1 bird flushed from Tree #39
11/24/02	D. Bradshaw	In position at 0630. Got red male from Tree #48 and UID bird from Tree #39 and third bird from unknown location. Followed birds until 0845 and lost them 100 meters SW of C11. No further IDs.
11/26/02	D. Bradshaw	Got red male from Tree #48, AL/OR – DB/DB/WH from Tree #39 and 3 rd bird with C1 colors from unknown location in vicinity of Tree #48. Lost birds to the west at 0800. RBWO roosting in Tree #45.

Cluster 1 Bird/Cavity Use Summary Table

Bird	**Tree/Cavity Use 2002**
DG/YE/DG – WH/AL	#45 during winter/ early spring
DG/YE/DG – RE2/AL	#48 (all dates)
AL/OR – DG/DG/OR	#39 – Release date only (10/18/02)
AL/OR – DB/DB/WH	#39 – Late fall/winter 2002/2003

APPENDIX II. Cluster 3 Field Observations and Cavity Use Summary Table - 2002

CLUSTER 3 OBSERVATIONS		
2/5/02	D. Bradshaw	Morning - Heard birds begin emerging at 0722. Yellow bird out of Tree #83 at 0725. A second bird emerged from Tree #82 at 0728; possibly white bird. Departed the site at 0745 after birds departed the area to the north and got out of range. No other IDs made. Evening - First bird came in from northwest at 1642. Flew toward Tree (#74). Two other birds arrived at 1649 and headed toward Cluster 4 inserts. 4th bird came in and joined a 5th bird around the nest cavity. They moved back and forth between inserts #2 and #3, then one roosted in nest cavity (#79). A hairy woodpecker arrived later and attempted to roost in the nest cavity, but was rebuffed by the RCW inside. The other RCW roosted in insert #2 at 1702. I departed at 1710. No birds were identified.
2/6/02	D. Bradshaw	First bird out at 0725 from across the way at old nest tree (#74). Immediately after, the dark green bird emerged from nest tree (#79). A third bird followed from Tree #3, and fourth bird of unknown origin. At 0735, the yellow and white birds came in from the Cluster 4 inserts. Was unable to ID any of the other birds before they left the area.
4/20/02	D. Bradshaw	Arrived 0640. Misty, cloudy. All birds already out. Several birds in immediate vicinity around nest tree. ID dark green, yellow, white, pink, purple, and unbanded bird. Birds checking into nest cavity about every 15 minutes, but not entering. Actual exchanges occurring about every 30 to 45 minutes. No evidence of food delivery.
4/21/02	D. Bradshaw	Arrived at 0715. Several birds around nest cavity area. Observed 5 exchanges at nest cavity before departing at 0830. No food delivery was observed. Birds seen were white, yellow, dark green, light green, pink, unbanded.
4/24/02	D. Bradshaw	Arrived at 0715. At 0717 the yellow bird arrived and replaced the unbanded bird inside the nest cavity. Light green bird replaced yellow bird at 0803. Dark green bird replaced light green at 0805. Yellow bird back in at 0812. Light green bird back in at 0820, followed by yellow bird at 0825. No food delivery during any exchanges. Departed the site at 0830.
4/26/02	D. Bradshaw	Arrived 0630. Birds already out. Observed exchanges at the nest cavity at 0631, 0634, 0641, 0645, 0649. White bird was last bird observed entering nest cavity 0649. Other birds seen were light green, dark green, yellow, and unbanded birds. No food delivery observed. Departed site at 0710.
4/29/02	D. Bradshaw	Arrived at 0645. Five exchanges at nest cavity between arrival and 0715. Birds observed were white, yellow, light green, purple, unbanded. Departed at 0730. No food delivery observed. Returned at 0825. Two birds were calling in high pitched tones to the northeast. Upon nearing them, it was observed that one of the birds was a Cluster 5 bird, although individual ID could not be determined. The other bird was the C3 pink bird. Also arriving to chase off the C5 bird was the C3 light green bird. At least 4 exchanges were observed at the nest cavity, involving the dark green, yellow, white, and unbanded birds, but no food delivery was observed. Departed the area at 0900.

Cluster 3 Observations (*cont.)*		
11/21/02	B. Watts D. Bradshaw B.vanEerden	Arrived at cluster at 0730 to get bird IDs. Birds were encountered right away and were foraging together east of tree 74. Birds were slowly foraging in the canopy and moving generally NW. Birds eventually crossed rt 604 and foraged around the adjacent compartment. Nine birds were identified including 8 from cluster 3 (unbanded, FWS/RD, WH/FWS, DG/FWS, YE/FWS, FWS/YE, LG/FWS and PU/FWS). One additional bird was detected that was from SC (FWS/OR, DG/DG/OR). This bird was a female that had been translocated in the last round and placed in the new natural cavity in cluster 1.
11/26/02	D. Bradshaw	Drove down 604 at 0845 and encountered C3 birds crossing 604. ID'd five birds: unbanded, white, light green, adult yellow, purple.

Cluster 3 Observation Data – Bird/Cavity Use Summary

Bird	**Tree/Cavity Use 2002**
RE/DB/RE – YE/AL	#83 (water discovered in cavity on 11/21/02)
RE/DB/RE – DG/AL	#79-01 (nest tree)
RE/DB/RE – LG1/AL	#74
RE/DB/RE – WH/AL	#82
RE/DB/RE – PU2/AL	#3 (beginning late spring 2002)
RE/DB/RE – PK2/AL	Unknown
RE/DB/RE – AL/YE	Unknown
RE/DB/RE – AL/RE	Unknown
RE/DB/RE – AL/DB	Unknown
Unbanded	#4 (beginning late spring 2002)
AL/OR – DG/DG/OR	Unknown

APPENDIX III. Cluster 5 Field Observations and Cavity Use Summary Table

CLUSTER 5 OBSERVATIONS		
2/6/02	D. Bradshaw	Set up at 1630 to monitor trees 20,21, and 23. Birds came in at 1707 from northeast and rallied outside cluster area. Bird came in to cluster and perched in open. Second bird then came in and roosted in Tree #99 at 1712. Two other birds moved around east side of cluster and roosted in Trees 22 and 23. It was never determined what happened to the first bird, and no birds were identified.
4/20/02	D. Bradshaw	Arrived 0800. Identified light green, white, yellow, pink, and unbanded birds. Confirmed at least 6 birds. Probably have eggs by now. Continual presence in nest cavity by different birds during hour I was present. White, light-green, and pink birds all observed spending time in nest cavity. Departed at 0900.
4/21/02	D. Bradshaw	Light green bird out of nest cavity at 0620. White bird entered nest cavity at 0629. Next exchange at 0646, then at 0651, then 0700. Dark banded bird observed entering cavity last before I left at 0705, but could not ID. No evidence of food delivery.
4/24/02	D. Bradshaw	Arrived at 0616, but already at least one bird out. White bird emerged from nest cavity at 0621. Light green bird went in to nest cavity. Exchanged with yellow bird at 0641. Exchanged with white bird at 0654. I departed at 0705 after observing no food delivery.
4/26/02	D. Bradshaw	Arrived at 0715. First exchange seen at 0721 with unbanded bird replacing white bird at nest cavity. No food exchange. All birds left the area foraging out to northeast. Departed the area at 0830.
4/29/02	D. Bradshaw	Arrived at 0740. Light green bird replaced white bird in nest cavity at 0744. Then Cluster 1 red male appeared and started vocalizing with C5 white female. At that time, the C5 unbanded bird arrived and chased off the C1 red bird to the northeast. The unbanded bird returned after about 5 minutes, but the red C1 birds was not seen again. Several other exchanges were observed at the nest but no food delivery was seen. I departed the area at 0820.
5/1/02	D. Bradshaw	Arrived at 0855. No birds on scene when I arrived. At 0905 the white birds arrived and went into the nest cavity. Then at 0920 the light green bird replaced her. White bird back in at 0930. White bird came out for about 3 minutes and then went back in at 0940. Yellow bird peered into nest cavity but no exchange, and no evidence of food delivery. Departed site at 0945.
5/3/02	D. Bradshaw	Arrived at 0730. Much activity around nest tree (#79-2). Several birds in the area, with birds exchanging places in the nest cavity every few minutes. After several minutes it became evident that birds were delivering prey items to nestlings. Spiders and large black ants were among prey identified. Departed at 0800.
5/10/02	D. Bradshaw	Arrived on site with banding team at 1100. Eric climbed and checked 79-1 to find a flying squirrel. At 79-2 he extracted 3 nestlings that were characteristic of 7 day olds. All three were banded and replaced in the cavity without incident. Colors used were light blue, dark blue, and yellow.

Cluster 5 Observations – *cont.*		
7/9/02	B.vanEerden	Reconnaissance determined that only trees 23/94/97 need restrictors Tree 23 – cavity blown out badly; could not place sufficient filler to fill damaged area; not enough support to keep filler in place before it could harden Tree 94 – cavity entrance enlarged; flying squirrel removed (mature adult) Tree 97 – lower cavity- existing face plate makes installation relatively easy. Minimal filler used on inside surface of plate.
10/18/02	D. Bradshaw B. Paxton B. Williams	Birds detected just after sunrise included light blue fledgling, dark blue fledgling, white, light green, and yellow adult.
11/19/02	B. Watts D. Bradshaw	Birds emerged at 6:54. All birds appeared to have emerged over a 15 sec period. A RBWO emerged from cavity 21-1. RCWO were known to emerge from 20-1, 93-1, 99-1, 98-1, 97-2, and 22-1. A bird was also believed to emerge from 97-1. Origin of other birds was not determined. A bird did not emerge from 95-1. Appeared to be at least 8 birds present. Five birds identified including unbanded, WH/FWS, LG/FWS, FWS/YE, FWS/LB. Birds foraged around cavity trees for long period and occasionally worked on cavity trees. Birds interacted with other woodpeckers including DOWO, RBWO, and YBSA. Birds eventually moved off to the NW toward 604.
11/26/02	D. Bradshaw	Drove down to C5 at 0900 and got birds leaving to cross clearcut. Picked up white, light blue, and unbanded. Left at 0930.

Cluster 5 Observation Data – Bird/Cavity Use Summary

Birds Present During 2002	**Tree/Cavity Use 2002**
WH/LB/WH – LG/AL	#97-02 primarily, also #22
WH/LB/WH – WH/AL	#97-02 ocassionally, otherwise unknown
WH/LB/WH – YE/AL	#98
WH/LB/WH – PK2/AL	Unknown
WH/LB/WH – DG/AL	Unknown
WH/LB/WH – AL/YE	Unknown
WH/LB/WH – AL/LB	Unknown
WH/LB/WH – AL/DB	Unknown
Unbanded	#94 winter/early spring 2002, unknown later

APPENDIX IV. Recruitment cluster field observations and cavity use summary table - 2002

CLUSTER 6 OBSERVATIONS		
11/09/02	B.vanEerden	0735-0821 Observed 2 birds interacting in close proximity to cavity trees. Bird 1 appeared to be left leg –AL/OR; right leg – LG/LG/WT, however only combination that approaches this is left leg – AL/OR; right leg – WT/WT/LB which is the female from South Carolina that was introduced into Cluster 12. Bird 2 showed a left leg combination of YE/DB/YE. The right leg was not seen. This is a Gates County bird.
11/26/02	D. Bradshaw	Walked through to Cluster 6 from Cluster 1 at 0810 and picked up Gates Co. male approx 100 meters northeast of C6 with a second UID bird. Lost them immediately over the canopy.
11/26/02	B.vanEerden	Tree 11 – active resin flow above and below cavity. No birds seen/heard @ 0733; probably already flushed. Other trees with no fresh resin wells.
CLUSTER 7 OBSERVATIONS		
7/9/02	B.vanEerden	Solitary RCW observed; right leg – red over aluminum; left leg – yellow ?? Worked on cavity entrance on tree (#113) for several minutes; assumed to have gone into cavity @ 8:20.
9/4/02	B.vanEerden	RCW flushed from Tree 113 at 0711. Flew to tree west of cavity and climbed trunk for 20 seconds, then flew off to east toward Cluster 1. Only bird seen/heard. No leg bands observed.
9/12/02	B.vanEerden C. Rabolli	1 bird observed – right leg – red over FWS; left leg – yellow, blue … combination unsure; possible that bird is female from Gates Co.
9/24/02	D. Bradshaw	Arrived at 0645 and took up a position approximately 50 meters west of the active cavity. I waited until 0745 before moving having seen no activity.
11/10/02	M.C.v Eerdn	Sunrise count - 1 bird confirmed, possibly 2 present
11/19/02	B. Watts	Walked into cluster at 0900 to check on status of cavity inserts and to see if birds were around. No birds were detected in area. Tree 113 had considerable work around cavity and good resin flow. Putty had been removed around entrance. Tree 112 had some bark plates removed but very little additional work. None of the other trees showed any signs of work.
11/21/02	D. Bradshaw	Set up at site ½ hour before sunrise. No birds seen/heard as of 45 minutes after sunrise.. Tree 113 appears active.
CLUSTER 8 OBSERVATIONS		
11/21/02	B.vanEerden	Arrived @ 0630, waited until 0720. No birds seen/heard. All cavities intact.

Recruitment Cluster Observations – *cont.*

CLUSTER 11 OBSERVATIONS		
11/10/02	B.vanEerden	Sunrise count - No birds seen/heard.
11/19/02	B. Watts	Walked into cluster at 0830 to check on status of cavity inserts and to see if birds were around. No birds were detected. Tree 140 had no work around insert. Tree 141 had the most work of any of the inserts. Some recent work around entrance in putty. Appeared to be a new start above the insert. Tree 142 had work around entrance with a considerable amount of the putty removed. Tree 143 had very little work with a couple of chips of putty taken out around entrance.
11/21/02	B. Watts	Staked out cluster at 0630 to see if any birds were roosting. No birds emerged from inserts. A single bird was heard out toward rt 604 at approximately 7:07. The bird was on the other side of the road near the swamp area. It called just once and was not seen. Departed at 0715.
CLUSTER 12 OBSERVATIONS		
10/05	B.vanEerden	No birds seen/heard but 1 bird arrived on site after sunrise. No ID.
11/09/02	R. Barnett	0655-0730 – no birds seen/heard. Chipping activity around entrance of 2 cavities. Diamond gridding exposed on one cavity; birds chipping into wood behind restrictor plate.
11/21/02	B. Watts	No birds seen/heard.
CLUSTER 13 OBSERVATIONS		
11/09/02	B.vanEerden	0635 - 2 birds flush from cavities, interacting. Forage towards edge of stand, heading north. No IDs
11/24/02	BvanEerden	0645 – First bird emerges. 0650 – second bird emerges. Birds move to edge of gap, forage along edge, then swing back to interior towards cluster. As light begins to improve, break off and fly south towards Cluster 5. Possibly a third bird (from Cluster 12?) flew in from north. Did not follow birds to the south. One of the birds w/ left leg orange band.